SEQUENCE LISTING

<110> Payne, Jewel

Sick, August

<120> Novel Bacillus thuringiensis Isolate Active Against Lepidopteran Pests, and Genes Encoding Novel Lepidopteran-Active Toxins

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<150> US 09/521,344

<151> 2000-03-09

<150> US 08/933,891

<151> 1997-09-19

<150> US 08/356,034

<151> 1994-12-14

<150> US 08/210,110

<151> 1994-03-17

<150> US 07/865,168

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Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser Glu Phe Val 35 40 45

Pro Gly Ala Gly Phe Val Leu Gly Leu Ile Asp Leu Ile Trp Gly Phe 50 55 60

Val Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile Glu Gln Leu 65 70 75 80

Ile Asn Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile Ser Arg 85 90 95

Leu Glu Gly Leu Ser Asn Leu Tyr Gln Ile Tyr Ala Glu Ala Phe Arg 100 105 110

Glu Trp Glu Ala Asp Pro Thr Asn Pro Ala Leu Thr Glu Glu Met Arg 115 120 125

Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Thr Thr Ala Ile Pro Leu 130 135 140

Phe Thr Val Gln Asn Tyr Gln Val Pro Leu Leu Ser Val Tyr Val Gln 145 150 155 160

Ala Ala Asn Leu His Leu Ser Val Leu Arg Asp Val Ser Val Phe Gly
165 170 175

Gln Arg Trp Gly Phe Asp Val Ala Thr Ile Asn Ser Arg Tyr Asn Asp 180 185 190

| | | | | | | | | | Ū | | | | | | |
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| Arg 225 | Tyr | Asn | Gln | Phe | Arg 230 | Arg | Gľu | Leu | Thr | Leu 235 | Thr | Val | Leu | Asp | Ile 240 |
| Val | Ser | Leu | Phe | Pro 245 | Asn | Tyr | Asp | Ser | Arg 250 | Thr | Tyr | Pro | Ile | Arg 255 | Thr |
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| Phe | Asp | Gly 275 | Ser | Phe | Arg | Gly | Met 280 | Ala | Gln | Arg | Ile | Glu 285 | Gln | Asn | Ile |
| Arg | Gln 290 | Pro | His | Leu | Met | Asp 295 | Leu | Leu | Asn | Ser | Ile 300 | Thr | Ile | Tyr | Thr |
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| Gly | Ile | Phe 355 | Arg | Thr | Leu | Ser | Ser 360 | Pro | Leu | Tyr | Arg | Arg 365 | Ile | Ile | Leu |
| Gly | Ser 370 | Gly | Pro | Asn | Asn | Gln 375 | Asn | Leu | Phe | Val | Leu 380 | Asp | Gly | Thr | Glu |
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| Gln | Arg | Gly | Thr | Val 405 | Asp | Ser | Leu | Asp | Val 410 | Ile | Pro | Pro | Gln | Asp 415 | Asn |
| Ser | Val | Pro | Ala 420 | Arg | Ala | Gly | Phe | Ser 425 | His | Arg | Leu | Ser | His 430 | Val | Thr |
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440

445

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| Ala | Pro | Leu 515 | Ser | Gln | Arg | Tyr | Arg 520 | Val | Arg | Ile | Arg | Tyr 525 | Ala | Ser | Thr |
| Thr | Asn 530 | Leu | Gln | Phe | His | Thr 535 | Ser | Ile | Asp | Gly | Arg 540 | Pro | Ile | Asn | Gln |
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695

700

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Asp Ser Gln His Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Thr Lys His
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Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Val 770 780

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Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp Ile Gly Cys 820 825 830

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Tyr Asp Arg Leu Gln Ala Asp Thr Asp Ile Ala Met Ile His Ala Ala 915 920 925

Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser 930 935 940

Val Ile Pro Gly Val Asn Ala Gly Ile Phe Glu Glu Leu Glu Gly Arg 945 950 955 960 Ile Phe Thr Ala Tyr Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn 965 970 975

Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val 980 985 990

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Gly Cys Val Thr Ile His Glu Ile Glu Asp Asn Thr Asp Glu Leu 1040 1045 1050

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Val Thr Cys Asn Asp Tyr Thr Ala Asn Gln Glu Glu Tyr Gly Gly 1070 1075 1080

Ala Tyr Thr Ser Arg Asn Arg Gly Tyr Gly Glu Ser Tyr Glu Ser 1085 1090 1095

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Tyr Ile Asp Gly Arg Lys Glu Asn Pro Cys Glu Ser Asn Arg Gly 1115 1120 1125

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| Gln | Leu | Ile | Ser | Gln 85 | Arg | Ile | Glu | Glu | Phe 90 | Ala | Arg | Asn | Gln | Ala 95 | Ile |
| Ser | Arg | Leu | Glu 100 | Gly | Leu | Ser | Asn | Leu 105 | Tyr | Lys | Val | Tyr | Val 110 | Arg | Ala |
| Phe | Ser | Asp 115 | Trp | Glu | Lys | Asp | Pro 120 | Thr | Asn | Pro | Ala | Leu 125 | Arg | Glu | Glu |
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| Trp 225 | Ile | Val | Tyr | Asn | Arg 230 | Phe | Arg | Arg | Gln | Leu 235 | Thr | Ile | Ser | Val | Leu 240 |
| Asp | Ile | Val | Ala | Phe 245 | Phe | Pro | Asn | Tyr | Asp 250 | Ile | Arg | Thr | Tyr | Pro 255 | Ile |
| Gln | Thr | Ala | Thr 260 | Gln | Leu | Thr | Arg | Glu 265 | Val | Tyr | Leu | Asp | Leu 270 | Pro | Phe |
| Ile | Asn | Glu 275 | Asn | Leu | Ser | Pro | Ala 280 | Ala | Ser | Tyr | Pro | Thr 285 | Phe | Ser | Ala |
| Ala | Glu | Ser | Ala | Ile | Ile | Arg | Ser | Pro | His | Leu | Val | Asp | Phe | Leu | Asn |

295

300

14 MA-43CDF2D3

| Ser 305 | Phe | Thr | Ile | Tyr | Thr 310 | Asp | Ser | Leu | Ala | Arg 315 | Tyr | Ala | Tyr | Trp | Gly 320 |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Gly | His | Leu | Val | Asn 325 | Ser | Phe | Arg | Thr | Gly 330 | Thr | Thr | Thr | Asn | Leu 335 | Ile |
| Arg | Ser | Pro | Leu 340 | Tyr | Gly | Arg | Glu | Gly 345 | Asn | Thr | Glu | Arg | Pro 350 | Val | Thr |
| Ile | Thr | Ala 355 | Ser | Pro | Ser | Val | Pro 360 | Ile | Phe | Arg | Thr | Leu 365 | Ser | Tyr | Ile |
| Thr | Gly 370 | Leu | Asp | Asn | Ser | Asn 375 | Pro | Val | Ala | Gly | Ile 380 | Glu | Gly | Val | Glu |
| Phe 385 | Gln | Asn | Thr | Ile | Ser 390 | Arg | Ser | Ile | Tyr | Arg 395 | Lys | Ser | Gly | Pro | Ile 400 |
| Asp | Ser | Phe | Ser | Glu 405 | Leu | Pro | Pro | Gln | Asp 410 | Ala | Ser | Val | Ser | Pro 415 | Ala |
| Ile | Gly | Tyr | Ser 420 | His | Arg | Leu | Cys | His 425 | Ala | Thr | Phe | Leu | Glu 430 | Arg | Ile |
| Ser | Gly | Pro 435 | Arg | Ile | Ala | Gly | Thr 440 | Val | Phe | Ser | Trp | Thr 445 | His | Arg | Ser |
| Ala | Ser 450 | Pro | Thr | Asn | Glu | Val 455 | Ser | Pro | Ser | Arg | Ile 460 | Thr | Gln | Ile | Pro |
| Trp 465 | Val | Lys | Ala | His | Thr 470 | Leu | Ala | Ser | Gly | Ala 475 | Ser | Val | Ile | Lys | Gly 480 |
| Pro | Gly | Phe | Thr | Gly 485 | Gly | Asp | Ile | Leu | Thr 490 | Arg | Asn | Ser | Met | Gly 495 | Glu |
| Leu | Gly | Thr | Leu 500 | Arg | Val | Thr | Phe | Thr 505 | Gly | Arg | Leu | Pro | Gln 510 | Ser | Tyr |
| Tyr | Ile | Arg 515 | Phe | Arg | Tyr | Ala | Ser 520 | Val | Ala | Asn | Arg | Ser 525 | Gly | Thr | Phe |
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| Asp 545 | Ala | Gly | Glu | Pro | Leu 550 | Thr | Ser | Arg | Ser | Phe 555 | Ala | His | Thr | Thr | Leu 560 |

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr 565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr 580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val 595 600 605

Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val 610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser 625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys 645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn 660 665 670

Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr 675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val 690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln 705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg 770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg 785 790 795 800

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile 805 810 815 Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile 820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu 835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys 850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu 865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe 885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met 900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu 915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu 930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn 945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val 965 970 975

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu 980 985 990

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys 995 1000 1005

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly 1010 1015 1020

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr 1025 1030 1035

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Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu 1055 1060 1065

| Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp 1070 1075 1080 | Glu Ala |
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| Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser 1085 1090 1095 | Val Tyr |
| Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro 1100 1105 1110 | Cys Glu |
| Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala 1115 1120 1125 | Gly Tyr |
| Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys 1130 1135 1140 | Val Trp |
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19 MA-43CDF2D3

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| gacgtattca | aagagaatta | cgtcacacta | ccgggtaccg | ttgatgagtg | ctatccaacg | 2220 |
| tatttatatc | agaaaataga | tgagtcgaaa | ttaaaagctt | atacccgtta | tgaattaaga | 2280 |
| gggtatatcg | aagatagtca | agacttagaa | atctatttga | tccgttacaa | tgcaaaacac | 2340 |
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| ggaaagtgtg | gagaaccgaa | tcgatgcgcg | ccacaccttg | aatggaatcc | tgatctagat | 2460 |
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3567

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Ser Ser Ile Asp Ile Ser Leu Ser Leu Val Gln Phe Leu Val Ser Asn 35 40 45

Phe Val Pro Gly Gly Gly Phe Leu Val Gly Leu Ile Asp Phe Val Trp 50 55 60

Gly Ile Val Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile Glu 65 70 75 80

Gln Leu Ile Asn Glu Arg Ile Ala Glu Phe Ala Arg Asn Ala Ala Ile 85 90 95

Ala Asn Leu Glu Gly Leu Gly Asn Asn Phe Asn Ile Tyr Val Glu Ala 100 105 110

Phe Lys Glu Trp Glu Glu Asp Pro Asn Asn Pro Ala Thr Arg Thr Arg 115 120 125

Val Ile Asp Arg Phe Arg Ile Leu Asp Gly Leu Leu Glu Arg Asp Ile 130 135 140

Ala Gln Ala Ala Asn Leu His Leu Ala Ile Leu Arg Asp Ser Val Ile 165 170 175

Phe Gly Glu Arg Trp Gly Leu Thr Thr Ile Asn Val Asn Glu Asn Tyr Asn Arg Leu Ile Arg His Ile Asp Glu Tyr Ala Asp His Cys Ala Asn Thr Tyr Asn Arg Gly Leu Asn Asn Leu Pro Lys Ser Thr Tyr Gln Asp Trp Ile Thr Tyr Asn Arg Leu Arg Arg Asp Leu Thr Leu Thr Val Leu Asp Ile Ala Ala Phe Phe Pro Asn Tyr Asp Asn Arg Arg Tyr Pro Ile Gln Pro Val Gly Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Ile Asn Phe Asn Pro Gln Leu Gln Ser Val Ala Gln Leu Pro Thr Phe Asn Val Met Glu Ser Ser Ala Ile Arg Asn Pro His Leu Phe Asp Ile Leu Asn Asn Leu Thr Ile Phe Thr Asp Trp Phe Ser Val Gly Arg Asn Phe Tyr Trp Gly Gly His Arg Val Ile Ser Ser Leu Ile Gly Gly Gly Asn Ile Thr Ser Pro Ile Tyr Gly Arg Glu Ala Asn Gln Glu Pro Pro Arg Ser Phe Thr Phe Asn Gly Pro Val Phe Arg Thr Leu Ser Asn Pro Thr Leu Arg Leu Leu Gln Gln Pro Trp Pro Ala Pro Pro Phe Asn Leu Arg Gly Val Glu Gly Val Glu Phe Ser Thr Pro Thr Asn Ser Phe Thr Tyr

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Asn Ser Val Pro Pro Arg Glu Gly Tyr Ser His Arg Leu Cys His Ala

Thr Phe Val Gln Arg Ser Gly Thr Pro Phe Leu Thr Thr Gly Val Val 435 440 445

Phe Ser Trp Thr His Arg Ser Ala Thr Leu Thr Asn Thr Ile Asp Pro 450 455 460

Glu Arg Ile Asn Gln Ile Pro Leu Val Lys Gly Phe Arg Val Trp Gly
465 470 475 480

Gly Thr Ser Val Ile Thr Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu 485 490 495

Arg Arg Asn Thr Phe Gly Asp Phe Val Ser Leu Gln Val Asn Ile Asn 500 505 510

Ser Pro Ile Thr Gln Arg Tyr Arg Leu Arg Phe Arg Tyr Ala Ser Ser 515 520 525

Arg Asp Ala Arg Val Ile Val Leu Thr Gly Ala Ala Ser Thr Gly Val 530 540

Gly Gly Gln Val Ser Val Asn Met Pro Leu Gln Lys Thr Met Glu Ile 545 550 555 560

Gly Glu Asn Leu Thr Ser Arg Thr Phe Arg Tyr Thr Asp Phe Ser Asn 565 570 575

Pro Phe Ser Phe Arg Ala Asn Pro Asp Ile Ile Gly Ile Ser Glu Gln 580 585 590

Pro Leu Phe Gly Ala Gly Ser Ile Ser Ser Gly Glu Leu Tyr Ile Asp 595 600 605

Lys Ile Glu Ile Ile Leu Ala Asp Ala Thr Phe Glu Ala Glu Ser Asp 610 615 620

Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Ser Asn 625 630 635 640

Gln Ile Gly Leu Lys Thr Asp Val Thr Asp Tyr His Ile Asp Gln Val 645 650 655

Ser Asn Leu Val Asp Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys 660 665 670

Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp Glu 675 680 685

Arg Asn Leu Leu Gln Asp Pro Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Pro Gly Thr Val Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Glu Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Leu Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Asn His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arq Glu Lys Leu Gln Leu Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu

Gln Val Asn Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val

His Arg Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly 945 950 955 960

Val Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala 965 970 975

Tyr Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn 980 985 990

Asn Gly Leu Leu Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu 995 1000 1005

Gln Asn Asn His Arg Ser Val Leu Val Ile Pro Glu Trp Glu Ala 1010 1015 1020

Glu Val Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile 1025 1030 1035

Leu Arg Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val 1040 1045 1050

Thr Ile His Glu Ile Glu Asp Asn Thr Asp Glu Leu Lys Phe Ser 1055 1060 1065

Asn Cys Val Glu Glu Val Tyr Pro Asn Asn Thr Val Thr Cys 1070 1075 1080

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| acacgtttcc | ttttgagtga | atttgttcca | ggtgtgggag | ttgcgtttgg | attatttgat | 180 |
| ttaatatggg | gttttataac | tccttctgat | tggagcttat | ttcttttaca | gattgaacaa | 240 |
| ttgattgagc | aaagaataga | aacattggaa | aggaaccggg | caattactac | attacgaggg | 300 |
| ttagcagata | gctatgaaat | ttatattgaa | gcactaagag | agtgggaagc | aaatcctaat | 360 |
| aatgcacaat | taagggaaga | tgtgcgtatt | cgatttgcta | atacagacga | cgctttaata | 420 |
| acagcaataa | ataattttac | acttacaagt | tttgaaatcc | ctcttttatc | ggtctatgtt | 480 |
| caagcggcga | atttacattt | atcactatta | agagacgctg | tatcgtttgg | gcagggttgg | 540 |
| ggactggata | tagctactgt | taataatcat | tataatagat | taataaatct | tattcataga | 600 |
| tatacgaaac | attgtttgga | cacatacaat | caaggattag | aaaacttaag | aggtactaat | 660 |
| actcgacaat | gggcaagatt | caatcagttt | aggagagatt | taacacttac | tgtattagat | 720 |
| atcgttgctc | tttttccgaa | ctacgatgtt | agaacatatc | caattcaaac | gtcatcccaa | 780 |
| ttaacaaggg | aaatttatac | aagttcagta | attgaggatt | ctccagtttc | tgctaatata | 840 |
| cctaatggtt | ttaatagggc | ggaatttgga | gttagaccgc | cccatcttat | ggactttatg | 900 |
| aattctttgt | ttgtaactgc | agagactgtt | agaagtcaaa | ctgtgtgggg | aggacactta | 960 |
| gttagttcac | gaaatacggc | tggtaaccgt | ataaatttcc | ctagttacgg | ggtcttcaat | 1020 |
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| catgtattaa atcatgttac atttgtacga tggccaggtg agatttcagg aagtgattca | 1320 |
| tggagagete caatgtttte ttggaegeae egtagtgeaa eecetacaaa tacaattgat | 1380 |
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| ttctccttgg acattgatgt tggatgtaca gacttaaatg aggacttaga tgtatgggtg | 2520 |
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 $^{{\}tt G: \SHARE \setminus Sequences \setminus MA-43CDF2D3.wpd/DNB/ehm}$

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| ggctatatco | : ttcgtgtcac | agcgtacaag | gagggatatg | gagaaggttg | cgtaaccatt | 3120 |
| catgagatcg | agaacaatac | agacgaactg | aagtttagca | actgcgtaga | agaggaagtc | 3180 |
| tatccaaaca | acacggtaac | gtgtaatgat | tatactgcaa | atcaagaaga | atacgggggt | 3240 |
| gcgtacactt | cccgtaatcg | tggatatgac | gaaacttatg | gaagcaattc | ttctgtacca | 3300 |
| gctgattatg | cgtcagtcta | tgaagaaaaa | tcgtatacag | atggacgaag | agacaatcct | 3360 |
| tgtgaatcta | acagaggata | tggggattac | acaccactac | cagctggcta | tgtgacaaaa | 3420 |
| gaattagagt | acttcccaga | aaccgataag | gtatggattg | agatcggaga | aacggaagga | 3480 |
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- Val Pro Gly Val Gly Val Ala Phe Gly Leu Phe Asp Leu Ile Trp Gly 50 55 60
- Phe Ile Thr Pro Ser Asp Trp Ser Leu Phe Leu Leu Gln Ile Glu Gln 65 70 75 80
- Leu Ile Glu Gln Arg Ile Glu Thr Leu Glu Arg Asn Arg Ala Ile Thr
 85 90 95
- Thr Leu Arg Gly Leu Ala Asp Ser Tyr Glu Ile Tyr Ile Glu Ala Leu 100 105 110
- Arg Glu Trp Glu Ala Asn Pro Asn Asn Ala Gln Leu Arg Glu Asp Val 115 120 125
- Arg Ile Arg Phe Ala Asn Thr Asp Asp Ala Leu Ile Thr Ala Ile Asn 130 135 140
- Asn Phe Thr Leu Thr Ser Phe Glu Ile Pro Leu Leu Ser Val Tyr Val 145 150 155 160
- Gln Ala Ala Asn Leu His Leu Ser Leu Leu Arg Asp Ala Val Ser Phe 165 170 175
- Gly Gln Gly Trp Gly Leu Asp Ile Ala Thr Val Asn Asn His Tyr Asn 180 185 190
- Arg Leu Ile Asn Leu Ile His Arg Tyr Thr Lys His Cys Leu Asp Thr 195 200 205
- Tyr Asn Gln Gly Leu Glu Asn Leu Arg Gly Thr Asn Thr Arg Gln Trp 210 215 220
- Ala Arg Phe Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val Leu Asp 225 230 235 240
- Ile Val Ala Leu Phe Pro Asn Tyr Asp Val Arg Thr Tyr Pro Ile Gln
 245 . 250 255
- Thr Ser Ser Gln Leu Thr Arg Glu Ile Tyr Thr Ser Ser Val Ile Glu 260 265 270

Asp Ser Pro Val Ser Ala Asn Ile Pro Asn Gly Phe Asn Arg Ala Glu 275 280 285

Phe Gly Val Arg Pro Pro His Leu Met Asp Phe Met Asn Ser Leu Phe 290 295 300

Val Thr Ala Glu Thr Val Arg Ser Gln Thr Val Trp Gly Gly His Leu 305 310 315 320

Val Ser Ser Arg Asn Thr Ala Gly Asn Arg Ile Asn Phe Pro Ser Tyr 325 330 335

Gly Val Phe Asn Pro Gly Gly Ala Ile Trp Ile Ala Asp Glu Asp Pro 340 345 350

Arg Pro Phe Tyr Arg Thr Leu Ser Asp Pro Val Phe Val Arg Gly Gly 355 360 365

Phe Gly Asn Pro His Tyr Val Leu Gly Leu Arg Gly Val Ala Phe Gln 370 375 380

Gln Thr Gly Thr Asn His Thr Arg Thr Phe Arg Asn Ser Gly Thr Ile 385 390 395 400

Asp Ser Leu Asp Glu Ile Pro Pro Gln Asp Asn Ser Gly Ala Pro Trp 405 410 415

Asn Asp Tyr Ser His Val Leu Asn His Val Thr Phe Val Arg Trp Pro 420 425 430

Gly Glu Ile Ser Gly Ser Asp Ser Trp Arg Ala Pro Met Phe Ser Trp 435 440 445

Thr His Arg Ser Ala Thr Pro Thr Asn Thr Ile Asp Pro Glu Arg Ile 450 455 460

Thr Gln Ile Pro Leu Val Lys Ala His Thr Leu Gln Ser Gly Thr Thr 465 470 475 480

Val Val Arg Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr 485 490 495

Ser Gly Gly Pro Phe Ala Tyr Thr Ile Val Asn Ile Asn Gly Gln Leu 500 505 510

Pro Gln Arg Tyr Arg Ala Arg Ile Arg Tyr Ala Ser Thr Thr Asn Leu 515 520 525

| Arg | Ile 530 | | Val | Thr | Val | Ala 535 | | Glu | Arg | Ile | Phe 540 | Ala | Gly | Gln | Phe |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Asn 545 | Lys | Thr | Met | Asp | Thr 550 | Gly | Asp | Pro | Leu | Thr 555 | Phe | Gln | Ser | Phe | Ser 560 |
| Tyr | Ala | Thr | Ile | Asn 565 | Thr | Ala | Phe | Thr | Phe 570 | Pro | Met | Ser | Gln | Ser 575 | Ser |
| Phe | Thr | Val | Gly 580 | Ala | Asp | Thr | Phe | Ser 585 | Ser | Gly | Asn | Glu | Val 590 | Tyr | Ile |
| Asp | Arg | Phe 595 | Glu | Leu | Ile | Pro | Val 600 | Thr | Ala | Thr | Phe | Glu 605 | Ala | Glu | Tyr |
| Asp | Leu 610 | Glu | Arg | Ala | Gln | Lys 615 | Ala | Val | Asn | Ala | Leu 620 | Phe | Thr | Ser | Ile |
| Asn 625 | Gln | Ile | Gly | Ile | Lys 630 | Thr | Asp | Val | Thr | Asp 635 | Tyr | His | Ile | Asp | Gln 640 |
| Val | Ser | Asn | Leu | Val 645 | Asp | Сув | Leu | Ser | Asp 650 | Glu | Phe | Cys | Leu | Asp 655 | Glu |
| Lys | Arg | Glu | Leu 660 | Ser | Glu | Lys | Val | Lys 665 | His | Ala | Lys | Arg | Leu 670 | Ser | Asp |
| Glu | Arg | Asn 675 | Leu | Leu | Gln | Asp | Pro 680 | Asn | Phe | Lys | Gly | Ile 685 | Asn | Arg | Gln |
| Leu | Asp 690 | Arg | Gly | Trp | Arg | Gly 695 | Ser | Thr | Asp | Ile | Thr 700 | Ile | Gln | Arg | Gly |
| Asp 705 | Asp | Val | Phe | Lys | Glu 710 | Asn | Tyr | Val | Thr | Leu 715 | Pro | Gly | Thr | Phe | Asp 720 |
| Glu | Cys | Tyr | Pro | Thr 725 | Tyr | Leu | Tyr | Gln | Lys 730 | Ile | Asp | Glu | Ser | Lys 735 | Leu |
| Lys | Pro | Tyr | Thr 740 | Arg | Tyr | Gln | Leu | Arg 745 | Gly | Tyr | Ile | Glu | Asp 750 | Ser | Gln |
| Asp | Leu | Glu 755 | Ile | Tyr | Leu | Ile | Arg 760 | Tyr | Asn | Ala | Lys | His 765 | Glu | Thr | Val |
| Asn | Val | Leu | Gly | Thr | Gly | Ser | Leu | Trp | Pro | Leu | Ser | Val | Gln | Ser | Pro |

775

780

- Ile Arg Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp
 785 790 795 800
- Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His 805 810 815
- His Ser His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu 820 825 830
- Asn Glu Asp Leu Asp Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp 835 840 845
- Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu 850 855 860
- Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg 865 870 875 880
- Asp Lys Arg Glu Lys Leu Glu Leu Glu Thr Asn Ile Val Tyr Lys Glu 885 890 895
- Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Gln 900 905 910
- Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg 915 920 925
- Val His Arg Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro 930 935 940
- Gly Val Asn Val Asp Ile Phe Glu Glu Leu Lys Gly Arg Ile Phe Thr 945 950 955 960
- Ala Phe Phe Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe 965 970 975
- Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu 980 985 990
- Glu Gln Asn Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala 995 1000 1005
- Glu Val Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile 1010 1015 1020
- Leu Arg Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val 1025 1030 1035

Glu

